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Is DRUG ADDICTION a BRAIN DISEASE?

PROGRAM ON MEDICAL SCIENCE AND SOCIETY

ETHICS AND PUBLIC POLICY CENTER

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The moral issues that shape foreign and domestic policy are central to the work of the Ethics and Public Policy Center. The Center is a non-profit institution established in 1976 to clarify and reinforce the role of the Judeo-Christian moral tradition in the American public policy debate. Its activities include research, writing, publications, and conferences. Current programs include Catholic Studies, Evangelical Studies, Jewish Studies, studies in religion and foreign policy, the Project on the Judiciary, the Program on Medical Science and Society, and the Marriage Law Project. The Center's president is Elliott Abrams.

ISBN 0-89633-189-X

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Preface

Dramatic advances in the neurosciences are creating the ability to predict and alter human behavior in ways unimaginable only a few years ago. The pace of these developments has outdistanced not only public understanding but also the measured consideration of physicians, ethicists, philosophers, theologians, and scientists themselves.

The Ethics and Public Policy Center's Program on Medical Science and Society addresses the unique challenges that biomedicine presents for society today. Under the direction of Frederick K. Goodwin, M.D., the program works in two directions: it seeks to improve public understanding of biomedical research, and it seeks to make physicians and scientists more aware of the social, cultural, political, and psychological contexts of biomedicine and its effects on both society and the individual. Various projects focus on:

- improving public understanding by strengthening public biomedical literacy and combating "junk science"/anti-science;
- promoting enlightened public policy on issues relating to health, health care, and biomedical research; and
- illuminating the implications of contemporary developments in the brain sciences for the ethical, religious, and philosophical underpinnings of Western society.

Is Drug Addiction a Brain Disease? is the first in a series of occasional papers from the Program on Medical Science and Society. Among the questions raised by this essay is whether the traditional concept of free will can be sustained in the face of new knowledge about biological and environmental forces that shape human behavior.

Is Drug Addiction a Brain Disease?

Sally L. Satel, M.D.*, and Frederick K. Goodwin,* M.D.

More than 100 substance-abuse experts gathered in Chantilly, Virginia, in November 1995, for a meeting called by the government's top research agency on drug abuse. A major topic was whether the agency, the National Institute on Drug Abuse (NIDA), which is part of the National Institutes of Health, should declare drug addiction a disease of the brain. The experts—academics, public-health workers, state officials, and others—said yes, overwhelmingly.[1]

At the time the answer was controversial, but since then, the notion of addiction as a brain disease has become widespread, thanks in large measure to a full-blown public-education campaign by NIDA. Waged in editorial boardrooms, town-hall gatherings, and Capitol Hill briefings and hearings, the campaign reached its climax in spring 1998 when media personality Bill Moyers catapulted the brain-disease concept into millions of living rooms with his five-part television special. Using imaging technology, Moyers showed viewers eye-catching pictures of addicts' brains under PET scan.[2] The cocaine-damaged parts of the brain were "lit up"—an "image of desire," one researcher called it.

Dramatic visuals are seductive and lend scientific credibility to NIDA's position, but politicians—and in particular President Clinton's drug czar, General Barry McCaffrey, who has begun reciting the brain-disease rhetoric—should resist this medicalized portrait for at least two reasons. First, it appears to reduce a complex human activity to a slice of damaged brain tissue. Second, and more important, it vastly underplays the reality that much of addictive behavior is voluntary.

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The idea of a "no-fault" disease did not originate at NIDA. For the last decade or so it has been vigorously promoted by mental-health advocates working to transform the public's understanding of severe mental illness. Until the early 1980s, remnants of the psychiatric profession and much of the public were still inclined to blame parents for their children's serious mental problems. Then accumulated neuroscientific discoveries began to show, irrefutably, that schizophrenia was marked by measurable abnormalities of brain structure and function. Diseases like schizophrenia and manic-depressive illness were products of a defective brain, not bad parenting.

The mental-health movement has drawn momentum from the twenty-year-old National Alliance for the Mentally Ill (NAMI), the nation's largest grassroots advocacy organization for people with severe psychiatric disorders and their families. NAMI has mounted a vigorous anti-stigma campaign—slogan: mental illnesses are brain diseases—that has sought to capture public attention through television exposure, publicized opinion polls and surveys, star-studded fund-raisers, and frequent congressional testimony. Its success can be seen in the increasing media coverage of severe mental illness, sympathetic made-for-TV specials about the mentally ill, and the widespread assumption, usually explicitly stated by reporters, that these conditions have a biological origin.

While some of those experts who met in Chantilly would say that emphasizing the role of will, or choice, is just an excuse to criminalize addiction, the experience of actually treating addicts suggests that such an orientation provides grounds for therapeutic optimism. It means that the addict is capable of self-control—a much more encouraging conclusion than one could ever draw from a brain-bound, involuntary model of addiction.

The brain-disease model leads us down a narrow clinical path. Since it implies that addicts cannot stop using drugs until their brain chemistry is back to normal, it over-emphasizes the value of pharmaceutical intervention. At the same time, because the model also says that addiction is a "chronic and relapsing" condition, it diverts attention from truly promising behavioral therapies that challenge the inevitability of relapse by holding patients accountable for their choices.

Getting a purchase on the true nature of addiction is difficult. Even the definition is elusive. For example, addiction can be defined by pathological state (as a brain disease if affected neurons are examined); by "cure" (as a spiritual disease if vanquished through religious conver-

sion); or by psychodynamics (as a matter of voluntary behavior if addicts are given incentives that successfully shape their actions). Yet when clinicians, scientists, and policymakers are confronted by such definitional choices, it makes the most sense to settle on the one with the greatest clinical utility. In what follows, therefore, I will argue the virtues of thinking about addiction as a primary, though modifiable, behavioral phenomenon, rather than simply as a brain disease. That is, addiction is a function of a person, rather than simply a physical state.

What Does "Brain Disease" Mean?

An NIDA article entitled "Addiction Is a Brain Disease, and It Matters," published in October 1997 in the prestigious journal *Science,* summarizes the evidence that long-term exposure to drugs produces addiction—that is, the compulsion to take drugs—by eliciting changes in specific neurons in the central nervous system. Because these changes are presumed to be irreversible, the addict is perpetually at risk for relapse. The article states:

> Virtually all drugs of abuse have common effects, either directly or indirectly, on a single pathway deep within the brain. Activation of this pathway [the mesolimbic reward system] appears to be a common element in what keeps drug users taking drugs. . . . The addicted brain is distinctly different from the non-addicted brain, as manifested by changes in metabolic activity, receptor availability, gene expression and responsiveness to environmental cues. . . . That addiction is tied to changes in brain structure and function is what makes it, fundamentally, a brain disease.[3]

Psychiatrist and molecular biologist Steven Hyman, now director of the National Institute of Mental Health, puts the biology in a larger, evolutionary context. "Adaptive emotional circuits make brains vulnerable to drug addiction," he says, "because certain addictive drugs mimic or enhance the actions of neurotransmitters used by those circuits."[4] By the time drugs and alcohol have become objects of intense desire, Hyman's research suggests, they've commandeered key motivational circuits away from normal human pleasures, like sex and eating. On a cellular level, bombardment by drugs and alcohol produces chronic adaptations in the neurons of the key circuits leading to dependence, a state in which the brain "demands" that the addict get high.

This is a distinctly different understanding of disease than that promoted by Alcoholics Anonymous, the institution most responsible for popularizing the disease concept of addiction. In AA, disease is employed as a metaphor for loss of control. Thus members might say, "I am unable to drink or take drugs because I have a disease that leads me to lose control when I do." And even though AA assumes that the inability to stop drinking once started is biologically driven, it does not allow this to overshadow its central belief that addiction is a symptom of a spiritual defect. The goal is sobriety through personal growth and the practice of honesty and humility.

The brain-disease advocates are operating in an entirely different frame of reference. Within it they have stipulated that "addiction" means compulsive drug-taking driven by drug-induced brain changes. They assume a correlation between drug-taking behavior and PET scan appearance, though such a correlation has yet to be clearly demonstrated (see note 2), and they speculate, on the basis of preliminary evidence, that subtle changes persist for years. The assumption seems to be that the neuroscience of addiction will give rise to pharmaceutical remedies. But to date, the search for a cocaine medication has come up empty. And the disposition to use drugs commonly persists among heroin addicts even after treatment with the best medication for normalizing the compulsion for heroin—methadone. That is because methadone does not, cannot, remedy the underlying anguish for which drugs like heroin and cocaine are the desperate remedy.

A *Time* magazine article entitled: "Addiction: How We Get Hooked" (May 5, 1997) asked: "Why do some people fall so easily into the thrall of alcohol, cocaine, nicotine and other addictive substances . . . ?" The answer, it said, "may be simpler than anyone dared imagine": dopamine, "the master molecule of addiction. . . . As scientists learn more about how dopamine works, the evidence suggests that we may be fighting the wrong battle [in the war on drugs]." Among the persons quoted is Nora Volkow, a PET expert at Brookhaven Laboratories, who says, "Addiction . . . is a disorder of the brain no different from other forms of mental illness." That new insight, *Time* intones, may be the "most important contribution" of the dopamine hypothesis to the fight against drugs.

Given the exclusive biological slant and naive enthusiasm of the *Time* article, one is not surprised at its omission of an established fact of enormous clinical relevance: that the course of addictive behavior can

be influenced by the very consequences of the drug-taking itself. When the addict reacts to adverse consequences of drug use—economic, health, legal, and personal—by eventually quitting drugs, reducing use, changing his pattern of use, or getting help, he does so voluntarily. Rather than being the inevitable, involuntary product of a diseased brain, these actions represent the essence of voluntariness. The addict's behavior can be modified by knowledge of the consequences.[5] Involuntary behavior cannot.

Clinical Features of Addiction

Addiction as a term does not exist in the formal medical lexicon, but drug addiction is generally equated with "drug dependence." In the American Psychiatric Association's *Diagnostic and Statistical Disorders Handbook* (fourth ed.), dependence denotes the persistent, compulsive, time-consuming use of a substance despite harmful consequences and often despite an expressed desire not to use it. Most dependent users develop tolerance—they must keep increasing doses to achieve a desired effect. They experience withdrawal symptoms and intense craving when the substance is stopped abruptly, followed by relief when use is resumed.

It is common for heroin-dependent persons to lose the ability to feel euphoric from the drug, yet continue to seek it solely to keep from going into withdrawal ("getting sick"). Withdrawal from heroin (and other opiate drugs including Demerol, morphine, Percocet, and codeine) or from alcohol, but not from cocaine, causes a predictable pattern of physical symptoms. Recall Jack Lemmon in the movie *Days of Wine and Roses,* sweating, anxious, his body wracked with tremors, desperate for alcohol after running out of whiskey. Or Frank Sinatra in *Man With the Golden Arm,* the heroin addict suffering painful muscle cramps and powerful cravings for heroin after his last fix wears off.

Unlike heroin and alcohol, cocaine does not produce florid physical withdrawal symptoms. The heavy cocaine addict typically uses the drug (by inhalation or injection) in a driven, repetitive manner for twenty-four to seventy-two hours straight. Cocaine wears off very quickly, and as it fades the yearning for more is overpowering. Each fresh hit quells the intense craving. The process winds down when the addict becomes too exhausted, runs out of money, or becomes too paranoid, a potential effect of cocaine and other stimulants, such as methamphetamine. He then "crashes" into a phase of agitated depression and hunger, followed

by sleep for twelve to thirty-six hours. Within hours to days after awakening he experiences powerful urges to use, and the cycle resumes.

It is almost impossible for a regular user in the midst of a cocaine binge or experiencing the withdrawal of heroin to stop using the drugs if they are available. He is presumably in the "brain disease" state, when use is most compulsive, neuronal disruption most intense. True, purposeful behavior can occur even in this state—for example, the attempt, sometimes violent, to get money or drugs is highly goal-directed—but at the same time the phase can be so urgent and impossible to derail that addicts ignore their screaming babies, frantically gouge themselves with dirty needles, and ruin families, careers, and reputations.

Nonetheless, most addicts have broken the cycle many times. Either they decide to go "cold turkey" or they end up doing so, unintentionally, by running out of drugs or money or landing in jail. Some heroin addicts admit themselves to the hospital to detoxify because they want to quit; others do so to reduce the cost of their habit, knowing they'll be more sensitive to the effects of heroin afterward. This latter behavior, while motivated by an effort to use drugs more efficiently, is nonetheless a purposeful step that the addict could have taken to re-exert lasting control.

In the days between binges cocaine addicts make many deliberate choices, and one of those choices could be the choice to stop using the drug. Heroin-dependent individuals, by comparison, use the drug several times a day but can be quite functional in all respects as long as they have stable access to some form of opiate drug in order to prevent withdrawal symptoms. Certainly some addicts may "nod off" in abandoned buildings, true to stereotype, if they consume more opiate than the amount to which their bodies have developed tolerance, but others can be "actively engaged in activities and relationships," according to ethnographers Preble and Gay. "The brief moments of euphoria after each administration constitute a small fraction of their daily lives. The rest of the time they are aggressively pursuing a career . . . hustling."[6]

Not always hustling, however. According to the Office of National Drug Control Policy, as many as 46 percent of drug users not in treatment reported legal-only sources of income, and 42 percent reported both legal and illegal.[7] The National Institute of Justice found that between 33 and 67 percent of arrested drug users indicate "full and part time work" as their main source of income.[8] These surveys do not relate income source to addiction severity, and it is reasonable to assume that

the heaviest users participate least in the legitimate economy. Nonetheless, the fact that many committed drug users do have jobs shows that addiction does not necessarily preclude deliberate, planned activity.

Interrupting the Addictive Process

In *The Moral Sense* (1993), James Q. Wilson distinguishes between the road to addiction and the state of being an addict. "Addiction is the result of a series of small choices that provide large immediate benefits but much larger and unwanted long-term costs," he writes, "but by the time the costs are fully understood, the user lacks the ability to forgo the drug the next time it becomes available." Indeed, the inability to forgo drug use is the hallmark of the addict's involuntary "brain disease." Nonetheless, the compulsion to take drugs does not dominate an addict's minute-to-minute or day-to-day existence. There are times when he is capable of reflection and purposeful behavior. During a cocaine addict's week there are periods when he is neither engaged in a binge nor wracked with intense craving for the drug. Likewise, during the course of a heroin addict's day he may feel calm and his thoughts may be lucid when he is confident of access to the drug and is using it in doses adequate to prevent withdrawal symptoms but not large enough to be sedating. At these times the addict is not the helpless victim of a brain disease.

Recall the Sinatra character Frankie. In the last scenes of *Man With the Golden Arm*, Frankie makes a purposeful, life-transforming move: he asks his girlfriend Kim Novak to lock him in a room to prevent him from buying more heroin. Imprisoned in a dreary walk-up, he spends a few days writhing miserably on the floor, begging to be released, pleading for a fix; but Novak holds firm, and days later, her man emerges calm and intact. This dramatic scene, while not medically recommended, illustrates how planned action can break the cycle of use. True, Frankie would have been helpless to control himself if not sequestered, but the point is that he made a deliberate effort to deny himself the opportunity. When properly "fixed," the heroin addict might rationally decide to enter a detoxification or methadone-maintenance program. Between binges the cocaine addict could decide to enter a treatment program or move across town, away from visual cues and personal associations that provoke craving. Yes, addicts *could* do these things—that is, no involuntary disease state is governing them—but if asked to do so, would they?

Probably not. Even those who wish passionately for a better life are

often kept entrenched by a profound fear of coping with life without drugs or by the despair of believing there is nothing better available for them. But for some the chances of saying no to the drug can depend on what is at stake. Practically speaking, many necessary things heretofore taken for granted could be put at risk if society decided to make them contingent upon abstinence; examples are welfare payments, employment, public housing, child custody.

A systematic plan that closes all avenues of support to those who cannot or will not stop using drugs—allowing them only elective treatment or, once arrested for non-violent drug-related crime, court-ordered treatment—seems radical. For one thing, it would require that the treatment system, especially costly residential treatment, be greatly expanded. For another, the policy of refusing addicts access to many public goods and services—or, better, administering small punishments or rewards contingent on performance—might strike some as unfair and objectionable.

But such a policy is not unethical according to a behavioral model of addiction. Society can legitimately place expectations and demands on addicts because their "brain disease" is not a persistent state. By contrast, it would be unthinkable to expect "victims" of true involuntary disease to control their afflictions. We would never demand that an epileptic marshal his willpower to control a seizure, or that a breast cancer patient stop her tumor from metastasizing. Experimental evidence shows, however, that addicts can control drug-taking. In his book *Heavy Drinking: The Myth of Alcoholism as a Disease*, philosopher Herbert Fingarette refutes the premise that alcoholism represents an inevitable total loss of control.[9] He cites numerous independent investigations conducted under controlled conditions in behavioral laboratories showing the degree to which alcoholics are capable of regulating themselves. Researchers found, for example, that the amount of alcohol consumed was related to its cost and the effort required to obtain it. Once offered small payments, subjects were able to refuse freely available alcohol. And after they had drunk an initial "priming" dose, the amount they subsequently consumed was inversely proportionate to the size of the payment.

Fingarette acknowledges that these results were obtained with hospitalized alcoholics who were also receiving social support and help. Perhaps, he says, the change in setting from home to hospital radically affects alcoholics' self-control and drinking patterns. Still, this "explana-

tion undermines the classic loss-of-control conjecture. . . . It is the social setting, not any chemical effect of alcohol, that influences drinkers' ability to exert control over their drinking."[10] Other experiments showed that the drinkers' beliefs and attitudes about alcohol influenced how much they consumed.[11]

The story of the returning Vietnam servicemen is a revealing natural experiment that "changed our views of heroin," according to epidemiologist Lee Robins and colleagues, who wrote the now classic paper on the subject.[12] They found that only 14 percent of men who were dependent on heroin in Vietnam—and who failed a publicized urine test at departure—resumed regular heroin use within three years of their return home. The rest had access to heroin and had even used some occasionally, but what made them decide to stop for good, Robins found, was the "sordid" culture surrounding heroin use, the price (the demand for heroin and cocaine is price-elastic[13]), and fear of arrest.

"Chronic and Relapsing" Brain Disease?

Given the heavy biomedical orientation at NIH, a signature like "chronic brain disease" is a device that aligns NIDA's mission with its parent's. Away from home, the major political purpose of the model is to establish a moral and clinical equivalence between addiction and other medical conditions. Diabetes, asthma, and high blood pressure are the trio most often cited as prototypical "chronic and relapsing" disorders. NIDA predicts that medicalization will destigmatize compulsive drug-taking and shift the commonly held perception of addicts from "bad people" to be dealt with by the criminal-justice system to "chronic illness sufferers" to be triaged to medical care. In the words of a recent NIDA report, "Vigorous and effective leadership is needed to inform the public that addiction is a medical disorder. . . . [It is not] self-induced or a failure of will."[14]

This is also the agenda of the newly formed group Physician Leadership on National Drug Policy, whose prestigious members include the former president of the AMA, a Nobel Prize winner, leaders at the Department of Health and Human Services, a former FDA director, and the surgeon general. The result of "concerted efforts to eliminate stigma" should be that substance abuse is "accorded parity with other chronic, relapsing conditions insofar as access to care, treatment benefits and clinical outcomes are concerned," according to a statement from Physician Leadership.[15] These sentiments have been echoed in reports from

the Institute of Medicine. "Addiction . . . is not well understood by the public and policymakers. Overcoming problems of stigma and misunderstanding will require educating the public . . . about the progress made," a 1997 report says.[16]

By changing popular opinion these institutions hope to work through federal and state legislatures to secure more treatment, expanded insurance coverage, and other services for addicts as well as more funding for addiction research. These are not unreasonable aims insofar as substandard quality of care, limited access to care, and understudied research questions remain active problems. But the destigmatizing approach has been too readily borrowed from the mental-health community. Along with the obvious deterrent value, stigmatizing is necessary to help enforce societal norms. Furthermore, forcing a rigid barrier between the so-called medical and moral arenas eclipses one of the most promising venues for anti-addiction efforts: the criminal-justice system (the courts and probation services), which can impose sanctions that greatly deter relapse.

The *Science* article asserts: "If the brain is the core of the problem, attending to the brain needs to be the core of the solution." How are we to do this? By using either "medications or behavioral treatments to reverse or compensate for brain changes."

The idea of medication is indeed a logical one—its effectiveness, to be discussed later, is another matter—and medications can certainly affect the brain. Even behavioral treatments, in the case of obsessive-compulsive illness, have been documented to alter the brain. Indeed, any effective behavioral treatments change the brain; otherwise there would be no lasting cognitive or emotional transformations. But to say that all treatments must work primarily on the brain is misleading. To extend this line of reasoning to recovery through religious conversion, a well-established phenomenon, one would have to say that spirituality first led to a brain change that then enabled the individual to defeat his habit—a bizarre, reductionistic way, it seems, of thinking about the inspirational properties of religion and one that underscores the impoverished clinical vocabulary of the brain-disease model.

Patients are not passive recipients of "doses" of medicine or therapy; they are participants in a dynamic process that, among other things, requires them to fight their urges to use drugs, discover ways to minimize those urges, and find alternative forms of gratification. This is hard work, and most addicts who volunteer for it do so under duress, com-

pelled by the threat of loss—loss of job, relationships, custody of children, even their own freedom.

In their *Lancet* article "Myths About the Treatment of Addiction," researchers Charles P. O'Brien and A. Thomas McLellan state that relapse to drugs is an inherent aspect of addiction and should not be viewed as a treatment failure. "Addiction should be [considered] a brain disease, similar to other chronic and relapsing conditions [in which] considerable improvement is considered successful treatment even though complete remission or cure is not achieved."[17] They argue that (1) relapse in long-term conditions like asthma, diabetes, and hypertension is often due to the patient's poor compliance with prescribed diet, exercise, or medication; (2) an addict's relapse is a result of poor compliance; thus (3) addiction is like other diseases.

But this is reversed. Asthmatics and diabetics who resist their doctors' orders resemble addicts, rather than addicts' resembling them. Asthmatics and diabetics may deteriorate spontaneously for physical reasons that are unprovoked and unavoidable; relapse to addiction, by contrast, invariably represents a failure to comply with "doctors' orders"—that is, to stop using drugs. Similarly confused are comparisons between addiction and medical conditions like cancer, epilepsy, and schizophrenia that were once stigmatized as resulting from personal weakness.[18] In cancer and epilepsy, the tumor and the seizure *result* from abnormal physiological processes, while drug abuse *produces* deranged physiology.

If one looks only at clinic-outcome studies, the claim that addiction is a chronic and relapsing disease has ample support, but data from the large Epidemiologic Catchment Area (ECA) study, funded by the National Institute of Mental Health, show that in the general population, long periods of remission, even permanent remission, for drug dependence (addiction) and drug abuse are the norm, not the exception.[19] According to ECA criteria for remission—defined as no symptoms for the year just prior to the interview—59 percent of roughly 1,300 respondents who met criteria for being users at some point in their lives were at that time free of drug problems. The average duration of remission was 2.7 years, and the mean duration of illness was 6.1 years, with about three-fourths of the cases lasting no more than eight years. Because the ECA, which surveyed a total of 20,300 adults, did not analyze drug abuse and drug dependence separately, it is impossible to know how the two differed: presumably, dependent users had longer dura-

tions of active symptoms and shorter remissions. Even so, these figures suggest that addiction is not an enduring problem in everyone it afflicts.

Drug Cures for Drug Addiction?

The pharmacological imperative is a logical outgrowth of placing the brain at the center of the addictive process. Still, attempts to treat addiction with other drugs or medications have been around for centuries. In the NIDA budget, about 15 percent goes to the Medications Development Division (MDD), which was authorized by Congress in 1992. One of NIDA's major goals was the development of an anti-cocaine medication by the turn of the century. But no magic bullet is streaking across the horizon, and the NIDA director has downgraded predictions about the curative power of medication, promoting it as potentially "complementary" to behavioral therapy.

It is always possible, of course, that an effective drug will be developed. But it is important, for the sake of the public's trust and NIDA's credibility, that the brain-disease advocates not oversell the promise of medications. To date, more than forty pharmaceuticals have been studied in randomized controlled trials in human beings for their effect on cocaine abuse or dependence. Some of these were intended to block craving, others to substitute for cocaine itself; none has yet proved even minimally effective. The basic problem with the anti-craving medications is their lack of specificity. Instead of deploying a surgical strike on the neuronal site of cocaine yearning, they end up blunting motivation in general and may also depress mood. Experiments with substitution drugs (e.g., cocaine-like substances such as methylphenidate) have proven equally frustrating, because instead of suppressing the urge to use, they tend to act like an appetizer, producing physical sensations and emotional memories reminiscent of cocaine itself and consequently triggering a desire for the real thing.[20]

If a selective medication could be developed, it might be especially helpful to cocaine addicts who have been abstinent for a time but who experience a sudden burst of craving for the drug, a feeling that is often reported as alien, coming from "out of nowhere," and different from a true desire to use cocaine. Such a craving may be triggered by some kind of environmental cue, such as passing through the neighborhood where the addict used to get high. Generally, the recovering addict learns his idiosyncratic cues, avoids them, and arms himself with exercises and

strategies (e.g., immediately calling a twelve-step sponsor) that help him fight the urge. It is conceivable that a medication could help suppress the jolt of desire and, ultimately, uncouple the cue from the conditioned response.

Another approach to cocaine addiction is immunization against the drug's effect.[21] In late 1995 scientists reported the promising effects of a cocaine vaccine in rats. The animals were inoculated with an artificial cocaine-like substance that triggered the production of antibodies to cocaine. When actual cocaine was administered, the antibodies attached themselves to the molecules of cocaine, reducing the amount of free drug available in the bloodstream to enter the brain. Immunized rats showed less cocaine-induced movement and sniffing, and when their brains were examined, the levels of cocaine were 50 to 80 percent lower than in non-immunized rats.

The vaccine is still being developed for use in humans, but the principle behind its presumed effect—behavioral "extinction"—is already being exploited by an available anti-heroin medication called naltrexone. Naltrexone blocks opiate molecules at the site of attachment to receptors on the neuron. Both naltrexone and the cocaine vaccine create a situation in which an addict who takes the illicit drug will feel little or no effect. Uncoupling the desired response (getting high) from the action intended to produce it (shooting up) is called "extinction," and according to behaviorist theory, the addict will eventually stop using a drug if he no longer achieves an effect. Though naltrexone is technically effective, most heroin addicts reject it in favor of methadone, which gives a mild high and has a calming effect. There are a few groups, however, who will take naltrexone with good results: impaired professionals (e.g., doctors, lawyers, nurses) who risk loss of their license, and probationers and defendants on work release who are closely supervised and urine-tested frequently.

The Methadone Success

Optimism surrounding the pharmaceutical approach to drug dependence stems from the qualified success of methadone, an opiate painkiller that was developed by German chemists during World War ll. First tested in 1964 as a substitute for heroin in the United States, methadone is now administered in maintenance clinics to about 19 percent of the nation's estimated 600,000 heroin addicts. Numerous studies have documented the socioeconomic benefits of methadone: significant reduc-

tions in crime, overdoses, unemployment, and, in some regions, HIV.[22]

Unlike heroin, which needs to be administered every four to eight hours to prevent withdrawal symptoms, methadone requires a single daily dose. A newly available medication called LAAM (levo-alpha-acetyl-methadol) can prevent withdrawal and craving for up to seventy-two hours. As a combination substitute and blocker, methadone and its cousin LAAM reduce or obliterate the craving for heroin. In addition, an addict on methadone maintenance who takes heroin will be blocked from experiencing a potent high. Like the drug for which it substitutes, methadone is addictive.

"Successful methadone users are invisible," the director of the Beth Israel Medical Center in New York City told the *New York Times.* Between 5 and 20 percent remain on the medication for over ten years.[23] Jimmie Maxwell, an 80-year-old jazz trumpet player, has stayed clean for the past thirty-two years by taking methadone every day. "I never missed a day of practice," he told reporter Christopher Wren. Unfortunately, people who like Maxwell lead a fully productive life and are otherwise drug-free may represent only 5 to 7 percent of methadone patients.[24] As many as 35 to 60 percent also use cocaine or other illicit drugs or black-market sedatives.[25] A six-year follow-up of treated addicts found that over half were readmitted to their agency at some point.[26]

This is not surprising. Methadone will only prevent withdrawal symptoms and the related physiological hunger for heroin. To be sure, a heroin addict who is given this opiate is much more likely to stay engaged in a treatment program, but methadone cannot make up for the psychic deficits that led to addiction, such as deep-seated intolerance of boredom, depression, stress, anger, and loneliness. The addict who began heavy drug use in his teens has not even completed the maturational tasks of adolescence; he has not developed social competence, consolidated a personal identity, or formed a concept of his future. Furthermore, methadone cannot solve the secondary layer of troubles that accumulate over years of drug use: family and relationship problems, educational deficiencies, health problems, economic losses. Consequently, only a small fraction of heroin addicts are able to become fully productive on methadone alone.

The failure to recognize this clinical reality was evident at a November 1997 NIH-NIDA conference I attended called "The Medical Treatment of Heroin Addiction."[27] So pervasive was the idea that a dysfunctional brain is the root of addiction that I was able to sit through the

entire two-and-a-half-day meeting without once hearing such words as "responsibility," "choice," "character"—the vocabulary of personhood. In fairness, speakers did acknowledge the importance of so-called psychosocial services, but they tended to view these as add-ons, helpful offerings to "keep" patients in the clinic while methadone, the core treatment, did its job. Not unexpectedly, the twelve-member panel concluded in its publicized consensus statement that "opiate drug addictions are diseases of the brain . . . that indeed can be effectively treated," and they "strongly recommend[ed] broader access to methadone maintenance treatment programs for people who are addicted to heroin or other opiate drugs."

The Residential Advantage

Unfortunately, the panel overlooked evidence showing that residential treatment is comparable to methadone (perhaps better) from both economic and quality-of-life perspectives. First, enduring benefit from methadone accrues only after the addict spends at least 360 days in the program. According to longitudinal studies, however, only 30 to 40 percent of an enrolled cohort stays beyond that 360-day point.[28] By comparison, treatment in a residential setting (without methadone) yields benefit after just ninety days, and, similarly, 30 to 40 percent of that cohort remains enrolled beyond the critical point. Phoenix House residential programs, which represent about 15 percent of the country's residential beds, actually retain 40 percent of their patients at the one-year mark, though most other residential programs continue to engage only about one in ten. Second, as for quality of life, although methadone is obviously less restrictive of patients' freedom than residential treatment, it does place long-term limits on that freedom by tethering patients to rigid dispensing regulations and clinic hours.

Relative to methadone maintenance, an equal or greater proportion of patients in residential treatment participate long enough for the treatment to have a social impact. In fact, in comparing patient outcomes, researchers found that enrollees in methadone maintenance and those in residential treatment had almost identical rates (about 27 percent) of a "highly favorable outcome," defined as no use of drugs (except, possibly, marijuana) and no arrests or incarcerations within a year after treatment.[29] Likewise, "moderately favorable" results were 41 and 40 percent, respectively. And although the cost of residential treatment is three to five times that of methadone maintenance, the considerable savings in

averted crime and resumed productivity associated with residential care, given its much earlier effectiveness (90 days compared to methadone's 360), make its benefit-to-cost ratio more than twice that of methadone maintenance.

Phoenix House Foundation runs the largest network of residential programs in the country. Its philosophy is that the addict himself, not the drug (nor his brain), is the primary problem. Thus the rehabilitation seeks to transform the destructive patterns of feeling, thinking, and behaving that make a recovering addict vulnerable to relapse. Group support and self-help are the therapeutic dynamic: residents continually reinforce for one another the expectations and rules of the community. All residents must work, above all so that they learn to accept authority and supervision, abilities vital to future success in the workforce. Residential programs last between eighteen and twenty-four months, "only a fraction of the twenty-one years it normally takes to raise a person," says psychiatrist Mitchell Rosenthal, Phoenix House president. Those who complete the program—only one in five do—have an excellent chance of success: five to seven years later 90 percent are still working and law-abiding, and 70 percent are completely drug free.[30] Contrast this to the less-than-one-in-ten rate of methadone-maintained addicts who become fully productive.

Given these outcomes, plus the fact that methadone patients are tied to a medication and the clinic that dispenses it, methadone does not deserve to be the sole beneficiary of the NIDA consensus statement. Residential slots are in gross undersupply—there are only 15,000 nationwide, outnumbered by methadone slots ten to one—and the consensus panel would have done well to call for greater opportunities in that domain as well.

Needed: Enlightened Coercion

"The biggest single need in this country is for a cocaine medication," asserted Alan I. Leshner, the NIDA director. "We have nothing now other than behavioral treatments."[31] But behavioral therapies make the most practical and theoretical sense. The literature on treatment effectiveness consistently shows that an addict who completes a treatment program—any program—either stops or markedly reduces his use of drugs after discharge. The problem is that only a small number of participants finish their programs. Estimates of attendance beyond fifty-two weeks, the

generally accepted minimum duration for treatment, range from 8 to 20 percent of the patients entering any of the three most common types of programs: outpatient counseling, methadone maintenance, or residential treatment.[32] Clearly, the biggest challenge to any treatment program is keeping patients in it.

How best to instill "motivation" is a perennial topic among clinicians; at least one form of psychotherapy has been developed for that explicit purpose. But routinely neglected by most mainstream addiction experts is the powerful yet counterintuitive fact that patients who enter treatment involuntarily, under court order, will fare as well as, and sometimes even better than, those who enroll voluntarily. Numerous studies, including large government-funded studies spanning three decades—the Drug Abuse Reporting Program (1970s), the Treatment Outcome Prospective Study (1980s), and the Drug Abuse Treatment Outcome Study (1990s)—all found that the longer a person stays in treatment, the better his outcome. Not surprisingly, those under legal supervision stay longer than their voluntary counterparts.

Compulsory Residential Treatment

The best-studied population of coerced addicts were part of California's Civil Addict Program (CAP), started in 1962. During its most active years, in the seventies, the program was impressively successful. It required addicts to be treated in a residential setting for two years and then closely supervised by specially trained parole officers for another five. These officers had small caseloads, performed weekly urine tests, and had the authority to return recovering addicts to treatment if they resumed drug use. Most of the addicts had been remanded to CAP for non-violent drug-related crimes, but some were sent because their addictions were so severe they were unable to care for themselves. This latter group was civilly committed in much the same way that gravely disabled mentally ill are often institutionalized.

The success came after a difficult start. During the first eighteen months, many California judges, unfamiliar with the new procedures, released patients on a writ of habeas corpus almost immediately after they'd been committed. This judicial blunder, however, allowed Anglin and colleagues to conduct an extensive evaluation of nearly 1,000 addicts, comparing those who received compulsory treatment with those who were mistakenly freed.[33] The two groups were otherwise comparable with respect to drug use and demographics. The researchers found

that 22 percent of the addicts who were committed reverted to heroin use and crime; this was less than half the rate for the prematurely released group. Other large-scale studies, including the Drug Abuse Reporting Program and the Treatment Outcome Prospective Study, convincingly show, as a result of compulsory treatment, a sustained rate of reduction in drug use and criminal behavior similar to or better than the reduction achieved by voluntary patients.

Though still legally on the books, the Civil Addict Program has become moribund, but the practice of court-ordered residential treatment continues. Unfortunately, parole and probation officers today are not nearly as scrupulous in supervising their charges as were their CAP counterparts. Among exceptions is a program developed by the Brooklyn, New York, district attorney called Drug Treatment Alternative to Prison (DTAP). It is the first prosecution-run program in the country to divert prison-bound drug offenders to residential treatment. The program targets drug-addicted felons with prior non-violent convictions who have been arrested for sales to undercover agents. Offenders have their prosecution deferred if they enter the 15-to-24-month program, and their charges are dismissed it they successfully complete the program. DTAP's one-year retention rate of 57 percent is markedly superior to the 13 to 25 percent rate typically seen in residential treatment. Recidivism to crime at six, twelve, and twenty-four months after program completion is consistently half that of DTAP-eligible defendants who were regularly prosecuted and sent to prison.[34]

Drug Courts: Treatment and Sanctions

In addition to coercing criminally involved addicts into residential treatment, the criminal-justice system is in an excellent position to use sanctions as leverage for compliance with outpatient treatment. Since 1989 it has been doing so through "drug courts," specialized courts that offer non-violent defendants the possibility of a dismissed charge if they plead guilty and agree to be diverted to a heavily monitored drug treatment program overseen by the drug-court judge. During regularly scheduled status hearings, the judge holds the defendant publicly accountable for his progress by taking into account dirty or missed urine tests and cooperation with the treatment program. Successes are rewarded, and violations are penalized immediately, though in a graduated fashion, starting with small impositions. Repeated failure generally results in incarceration.

Early data on more than eighty drug courts show an *average* retention rate (defined as the sum of all participants who either have completed or are still in drug-court programs) of 71 percent. Even the *lowest* rate of 31 percent greatly exceeds the average one-year retention rate of about 10 to 15 percent for non-criminal addicts in public-sector treatment programs.

One study conducted by the Urban Institute was designed to examine the influence of sanctions on offenders in the District of Columbia drug court.[35] Three options were followed: (1) the “sanctions track”: urines were obtained twice weekly, and there were increasingly severe penalties (e.g., a day or more in jail) for missed or dirty urines; (2) the “treatment track”: intensive treatment for several hours a day, without predictable sanctions for missed or dirty urines; (3) the control group: urine tests twice a week, but without predictable sanctions. Researchers found that treatment-track participants were twice as likely to be drug-free in the month before sentencing as those in the control group (27 vs. 12 percent), while sanctions-track participants were three times as likely to be drug-free (37 vs. 12 percent). The certainty of consequences was psychologically powerful to the participants. Senior researcher Adele Harrell learned in her focus groups with study participants that they credited their ability to stay clean to the “swiftness of the penalties—they had to report to court immediately for a test failure—and their fairness.”

And the longer participants stayed in drug court, the better they fared. According to information maintained by the Drug Court Clearinghouse at American University, the differences in rearrest rates were significant. Drug courts operational for eighteen months or more reported a completion rate of 48 percent. Depending upon the characteristics and degree of social dysfunction of the graduates, the rate of rearrest—for drug crimes, primarily—within one year of graduation was 4 percent. Even among those who never finished the program (about one in three fail to complete it), rearrest one year after enrollment ranged from 5 to 28 percent. Contrast this with the 26 to 40 percent one-year rearrest rate reported by the Bureau of Justice Statistics for traditionally adjudicated individuals convicted of drug possession.[36]

These examples show how law enforcement brings addicts into a treatment system, enhances the probability that they will stay, and imposes sanctions for poor compliance with treatment. (The Urban Institute study even forces one to question whether treatment is invariably

necessary, since the sanctions-without-treatment track had considerably better results than the treatment-without-sanctions tract.) They also highlight the folly of dividing addicts into two camps: "bad people" for the criminal-justice system to dispose of, and "chronic-illness sufferers" for medical professionals to treat. If the brain-disease model transforms every addict into a "sufferer," then the use of coercion to change that person's behavior seems impossible to justify. Thus the brain-disease model fails to accommodate one of the most productive approaches in the history of anti-drug efforts.

Entitlements as Shapers of Behavior

The perception of the addict as a "chronic illness sufferer" also diverts attention from another very promising approach: the use of public entitlements to shape behavior. The Veterans Administration is conducting two demonstration projects wherein addicted, mentally ill veterans "turn over" their sizable monthly benefits to a payee who manages their money and distributes it as a reward contingent upon compliance with treatment. Compare this so-called contingency management to the now defunct federal disability program for addicts, Supplemental Security Income's "DA&A" program. From 1972 to 1994, poor addicts were eligible for income maintenance and federal benefits solely because they had the medical disability of addiction. Not surprisingly, cash often went to purchase drugs, designated payees were sometimes addicts themselves, and few recipients attended treatment. According to the Department of Health and Human Services, less than 1 percent of a cohort of recipients followed for four years left the rolls through "recovery."

A large body of research shows that contingency management (CM) of the sort the Veteran Administration is trying can be successfully applied. One of the earliest studies involved deteriorated, skid-row alcoholic volunteers. Ten were randomly chosen to be eligible for housing, medical care, clothing, and employment services if their blood alcohol levels were below a minimum level. The other ten could obtain these services from the Salvation Army as usual. The volunteers who were rewarded for not drinking did far better at maintaining sobriety and employment.[37]

More recent controlled research on CM uses vouchers redeemable for goods. Much of it has been conducted by psychologists Steve Higgins of the University of Vermont and Kenneth Silverman of Johns Hopkins University, whose work consistently demonstrates that cocaine and heroin

abusers substantially reduce or cease drug use and remain in treatment longer when they are given goods-redeemable vouchers for each negative urine submitted. Silverman and colleagues also conducted a small pilot project in which unemployed heroin users on methadone significantly increased their attendance at job-skills training when they were given vouchers based on attendance.[38]

The contingency-management model has implications for other forms of public largesse, including welfare. About 20 to 25 percent of mothers on welfare or TANF (Temporary Aid to Needy Families) are estimated to abuse drugs, and many states are considering a treatment requirement for these recipients.[39] But since drop-out from treatment is high, simply prescribing treatment-as-usual for these women may not reduce their drug use to the point of employability.

Welfare reform provides an excellent opportunity to transform the perverse reward of public entitlements into constructive incentives that promote recovery and autonomy by using the very same benefits that the system now offers. In this way, states could capitalize on the proven virtues of leverage to enhance retention in treatment and to shape behavior directly.

Concluding Observations

Labeling addiction a chronic and relapsing brain disease succeeds more as sloganism than as public health education. By locating addiction in the brain, not the person, NIDA has generated an unwarranted level of enthusiasm about pharmacology for drug addiction. By downplaying the volitional dimension of addiction, the brain-disease model detracts from the great promise of strategies and therapies that rely on sanctions and rewards to shape self-control. And by reinforcing a dichotomy between punitive and clinical approaches to addiction, the model devalues the enormous contribution of criminal justice to combating addiction.

The fact that many, perhaps most, addicts are in control of their actions and appetites for circumscribed periods of time shows that they are not perpetually helpless victims of a chronic disease. They are instigators of their addiction, just as they are agents of their own recovery . . . or non-recovery. The potential for self-control should allow society to endorse expectations and demands of addicts that would never be made of someone with a true involuntary illness. Making such demands is, of course, no assurance they'll be met. But confidence in their very

legitimacy would encourage a range of policy and therapeutic options—using consequences and coercion—that is incompatible with the idea of a no-fault brain disease.

Efforts to neutralize the stigma of addiction by convincing the public that the addict has a "brain disease" are understandable, but in the long run they have no more likelihood of success than the use of feel-good slogans to help a child acquire "self-esteem." Neither respectability nor a sense of self-worth can be bestowed; both must be earned. The best way for any institution, politician, or advocate to combat the stigma of addiction is to promote conditions—both within treatment settings and in society at large—that help the addict develop self-discipline and, along with it, self-respect. In this way, former addicts become visible symbols of hard work, responsibility, and lawfulness—potent antidotes to stigma.

This prescription does not deny whatever biological or psychological vulnerabilities individuals might have. Instead, it makes their struggle to master themselves all the more ennobling.

NOTES

1. Second annual NIDA Constituent Conference, Chantilly, VA, November 20, 1995.

2. Positron emission tomography (PET) allows researchers to visualize brain metabolic function. Using radioactively labeled glucose or other compounds tailored to specific types of cellular receptors (e.g., the dopamine receptor), researchers can create brain maps by measuring the levels of metabolism or receptor activity in particular brain regions. For example, PET scans of cocaine addicts obtained at two weeks, one month, and four months after last use show persistent decrements in dopamine metabolism. [Volkow, N.D., et al., "Changes in Brain Glucose Metabolism in Cocaine Dependence and Withdrawal," *American Journal of Psychology* 148 (1991): 621-26.] Despite a virtual library of documented, replicable brain changes with drug exposure (in receptor activity, intracellular biochemical changes, blood flow, glucose metabolism, and more), however, there have been no scientific studies correlating them with behavior, according to biochemist Bertha Madras, who teaches psychiatry at Harvard Medical School. "That will be the second generation of studies," she says. [Personal communication.] As Professor Daniel Shapiro of West Virginia University commented, "We could examine brains all day and by whatever sophisticated means we want, but we would never label someone a drug addict unless he acted like one." [Personal communication.]

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4. Institute of Medicine, *Dispelling the Myths About Addiction* (National Academy of Sciences Press, 1997), 44-46.

5. See Heyman, G. M., "Resolving the Contradictions of Addiction," *Behavioral and Brain Science* 19 (1996): 561-610.

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15. Physician Leadership on National Drug Policy, Consensus Statement, July 9, 1997. See also Medical News and Perspective in *Journal of American Medical Association* 278, no. 5 (1997): 378.

16. Institute of Medicine, *Dispelling the Myths*, 1.

17. O'Brien, C. P., and McLellan, A. T., "Myths About the Treatment of Addiction," *Lancet* 347 (1996): 237-40.

18. Institute of Medicine, deliberations of the Committee to Identify Strategies to Raise the Profile of Substance Abuse and Alcoholism Research, 1996 (author was a member of the committee).

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